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ATOMIC ENERGY ACT - 1954

DEPARTMENT OF STATE

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7 pages No. 1 of 12  
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Memorandum of Conversation

490

DATE: August 26, 1959

APPROVED GDD

SUBJECT: Geneva Nuclear Test Negotiations - Meeting of Principals

PARTICIPANTS:

State: Mr. Dillon  
Mr. Sullivan, S/AE  
Mr. Spiers, S/AE  
Mr. Morris, S/AE

Defense: Mr. McElroy  
General Loper  
Mr. Knight  
CIA: Mr. Dulles  
Dr. Scoville

AEC: Mr. McCone  
White House:  
Mr. Gray  
Dr. Kistiakowsky  
Dr. Killian  
Mr. Keany

COPIES TO:

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Dr. Kistiakowsky  
AEC - Mr. McCone - 2  
CIA - Mr. Dulles - 2  
Defense - Mr. McElroy - 2



Mr. Dillon said that he had called today's meeting to provide an opportunity for Dr. Kistiakowsky to brief the principals on the report of the Ad Hoc Panel on Nuclear Test Requirements and for Dr. Killian to report on the meeting of the Joint Group of British and American Scientists in London.

Dr. Kistiakowsky explained that the Ad Hoc Panel on Nuclear Test Requirements had been convened in accordance with Action No. 2108 b(1) of the National Security Council, as approved by the President on July 20, 1959. The President had further instructed that the Panel not engage in an assessment of the relative position of the United States vis-a-vis the Soviet Union. Therefore, the report deals only with United States military technology and leaves open the question of our nuclear strength relative to the Soviet Union. This report should thus be considered but one input into our consideration of the over-all question of resumption of nuclear weapons tests. The following members of the Panel participated as individuals and not as representatives of their specific organizations and were selected to represent as broad an area of expertise as possible:

Dr. James W. McRae, Chairman  
Dr. Hans A. Bethe  
Dr. Arthur T. Biehl  
Dr. Norris E. Bradbury  
Dr. Harold Brown  
Dr. G. A. Fowler  
Dr. Marshall G. Holloway  
Dr. Richard Latter

Honorable Herbert B. Loper  
Dr. Carson Mark  
Rear Admiral Edward N. Parker  
Dr. Edward M. Purcell  
Vice Admiral John H. Sides  
Brigadier General Alfred D. Starbird  
Dr. Edward Teller  
Dr. Jerome B. Wiesner

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Dr. Kistiakowsky then read the following General Conclusions of the Ad Hoc Panel:

"1. Certain proposed nuclear tests would appreciably increase the effectiveness of key programmed weapon systems and guarantee against the possibility of gross error in design. However, aside from the weapon safety problem, the development or military use of no presently programmed weapon system is clearly contingent on the outcome of the proposed nuclear tests."

Dr. Kistiakowsky explained that whereas the AEC laboratories feel that various programmed warheads may have been amply proven out by past developmental testing, the Department of Defense would like proof tests of the finished weapons. The laboratories further believe that with additional testing it will be possible to double the yields of many of our missile warheads of a given weight. They are prepared to guarantee improvements on warhead yields on the basis of mock-up tests which would probably involve from 20 to 100 kilotons nuclear yield and which could be conducted underground. The Department of Defense, however, believes that full-scale proof tests of such improved devices would be necessary. Such large tests, of course, could not be conducted underground although they could be carried out in outer space.

Mr. McElroy asked whether the scientists indeed believe they could obtain adequate diagnostics on space tests for megaton range weapons. Dr. Kistiakowsky replied that it is necessary to differentiate between the "high altitude" region which would extend out roughly to 20,000 kilometers and the "outer space" region beyond that distance. High altitude tests would be relatively easy to conduct. Our experience at Johnson Island indicated that there would be no problem in getting very extensive diagnostics even though the tests would produce highly spectacular "fireworks". To go to outer space powerful boosters will be required. These tests will be hard to instrument since it will not be possible to send up special follower rockets containing instrumentation as was done at Johnson Island. On the other hand, the Panel felt that it would be possible to measure the yields of such tests which, after all, is what is desired from proof tests.

"2. Questions have arisen concerning the safety of certain designs in stockpile and production against the possibility of a very low yield nuclear explosion in case of accident. Highest priority in testing should be given to the experimentation involving very low yield or zero yield 'safety' shots intended to establish whether a problem really exists. It is not possible now to determine whether a satisfactory solution to the problem, if it exists, can be found in all cases without nuclear tests."

Dr. Kistiakowsky explained that the questions with regard to the one-point safety of our very important weapons have arisen from calculations done recently at Los Alamos. There are three possible courses of action to resolve this problem:

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(1) Safety tests of stockpile primaries could be conducted underground in a relatively brief time. If the primaries prove safe there would, of course, be no nuclear yield.

(2) One could use cores of stockpile design containing reduced amounts of plutonium and carry out carefully instrumented tests designed so as to preclude a nuclear explosion in excess of a predetermined yield, such as one pound TNT equivalent. This type of experiment would take more time than the first alternative but would probably result in more detailed information on the safety of present designs.

(3) One could rely on the more detailed calculations which Los Alamos is now doing and not carry out any tests. The majority of the Panel, however, felt that tests were essential. Others, mainly from LANL, felt that tests would not resolve the situation any better than carefully planned calculations. Dr. Kistiakowsky pointed out that in any event no test can definitely prove that a given device is absolutely safe.

Dr. Kistiakowsky explained that the results of further experimentation could be:

a. That IASL's concern is unfounded and the devices are in fact one-point safe.

b. That the devices prove to be only slightly unsafe and could be modified by the laboratories without significant further nuclear tests.

c. That the devices prove to be unsafe and thus will require complete retesting. In this case, however, one could decide to use for the devices in question a primary which is known to be one-point safe.

Dr. Kistiakowsky noted that IASL's recalculations should be completed very soon and that preliminary results seemed to be more reassuring than their previous calculations.

Mr. Dillon asked how long the second alternative for testing the safety of the questionable devices would take. General Loper thought such tests could probably be started in about two weeks from go-ahead. Dr. Kistiakovsky said that one problem would be that [redacted] plutonium would be scattered around by the tests. Since this is a very toxic substance the tests would have to be conducted underground, presumably at the Nevada Testing Grounds. Mr. McCombe said that plans for such tests presented a real problem since the press representatives closely watch the activities at the Nevada Proving Grounds, General Starbird has said he did not think it would be possible to provide a successful cover for such an operation. Dr. Kistiakovsky said he thought that it would be possible to conduct these tests at Los Alamos in the classified areas. One would only need tunnels around 30 to 40 feet deep, which could be dug in the canyons where there is complete privacy. The shots could be billed as just more HE explosions of which dozens are set off at LASL everyday.

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Mr. Dillon said he did not see any particular reason why it would not be possible to proceed with such tests at Los Alamos. They would not represent a violation of our unilateral suspension since they were not really nuclear tests. However, this would be a matter for the President to decide upon when there is an opportunity to present the issue to him.

"3. Certain proposed nuclear tests would explore new ideas which point to new applications and which, by advancing the state of the art, will also almost certainly lead to new, and presently unpredicted concepts in weapon systems and doctrine."

Dr. Kistiakovsky said that the Panel had been generally unanimous in the opinion that, on the basis of past experience in weapons development, further research tests would lead to new applications. It was, of course, impossible to predict what new ideas and new information might flow from the tests now proposed. Dr. Teller, for one, is very enthusiastic about the possibilities.

"4. Although there is no immediate information required for specific military systems, the proposed high altitude effects tests might yield unexpected information of great technical importance."

Dr. Kistiakovsky explained that our high altitude tests in 1958



It is clear that high frequency radio is unreliable in time of war. Further high altitude effects tests might discover new phenomena of importance.

Mr. McCombe asked whether the Defense Department did not feel that immediate additional information was necessary considering the dramatic effects of high altitude shots on radar and radio. General Loper said that the evidence pointing to a severe disruption of high frequency communications leads to a redesign of communications system rather than to an urgent need for more information on the disruptive effect. As for the AICM system, the other facets of this system are far less certain than the effects of the AICM warhead on an incoming weapon.

"5. The proposed effects tests in the sea and at low altitudes would provide militarily valuable information but their results would not affect any decisions to use or not to use a proposed military capability."

Dr. Kistiakovsky explained that these would be tests of devices such as the anti-submarine depth bomb, where the Department of Defense requires more information on the radiation hazards to the launching destroyer or of the effect of water waves on coastal cities. Similarly, they are concerned about the earth shocks which would result from

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surface explosions and their effect on hardened missile bases. The Defense Department is, however, proceeding with their plans for the use of these weapons regardless of further effects tests. General Loper said that although the results of such tests would not affect any decisions to use or not to use a certain weapon they would vitally affect decisions on how to use and when to use it.

"6. Aside from tests incident to the safety problem, there is not a strong technical requirement for the conduct of any single proposed test in the immediate future. Failure to reach a decision now to conduct proposed nuclear tests within a year and to proceed with plans and preparations on this basis would postpone the achievement of anticipated improvements in weapon system effectiveness and the evolution of new ideas."

Mr. McElroy noted that some of the proposed testing could have a major effect on the reduction of costs of our nuclear arsenal.

"7. The major objectives of the proposed nuclear tests could be achieved by contained underground shots except for certain high yield development tests and the weapon effects test program. The high yield development tests could be conducted at altitudes of 500-1000 kilometers in 1961 and in space (beyond 100,000 kilometers) at considerable cost in the period from 1961 to 1965, the date for each test depending on the weight of the device."

Dr. Kistiakowsky explained that one could be reasonably certain that there would be no fallout on the earth from tests conducted beyond 100,000 kilometers in space. However at, for instance, 1,000 kilometers one would have to concede that explosion products would eventually drift into the atmosphere even though this process might take a very long time.

#### General Discussion

General Loper said that it was not the position of the Department of Defense that everything must be proof-tested before being acceptable to the military. Rather they believe that full-scale tests of weapons are necessary in cases where the extrapolation from proven designs is quite broad. The laboratories never guarantee the performance of a device, but only indicate a degree of confidence. Thus, even in the minds of the designers there exists a possibility of gross error in weapon performance. Dr. Kistiakowsky commented that such was the situation with some of the key warheads in our stockpile.

Mr. McElroy said that he believed the development of nuclear weapons to be of far more importance to the United States than to nations with large numbers of people. Our nuclear arsenal is what permits us to be a military power. This power would be much inferior if we were reduced to reliance on our manpower armed with conventional weapons. Dr. Kistiakowsky suggested that it was probably not so much a question of population as the unwillingness of Westerners to be used as cannon-fodder. After all, the combined manpower of the United States and the NATO countries is greater than that of the USSR and its satellites. Mr. Dulles said he believed that never again would we fight with millions of soldiers in the field of battle.

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Mr. McDone said that he was personally very much concerned with the moderate tone in which the general conclusions of the Ad Hoc Panel were expressed. This did not seem to accord with the very important examples of testing needs set forth in the report. He thought it very important that the principals realize that further testing could dramatically increase the yields of some of our warheads. These improvements might be extremely important to the defensive position of the United States. With regard to the one-point safety problem, he noted that if further experimentation discloses that a redesign of primaries is necessary to provide adequate safety it might be necessary to test new primaries.



Dr. Kistiakovsky commented that the Panel had seriously questioned this latter possibility because it assumed a significant decrease in the weight of guidance components.

Mr. Dillon said that if the position of the AEC laboratories that improvement in large yield weapons will be possible by underground tests of relatively low yield mock-ups is true, the United States would be in rather good shape if we agree to a ban which excluded underground tests. Mr. McKelroy said he thought that from the Defense point of view the United States would get along all right if they were able to conduct underground tests. He believed that a limited agreement, as approved on July 23, would be reasonable in terms of the present international atmosphere. The Defense Department, however, would be deeply concerned if the present unilateral withholding of testing continued much longer.

Mr. Killian asked whether the Panel had discussed the relative value of increasing the accuracy of missile guidance and booster power as opposed to seeking to increase the warhead yields as a solution to improving the effectiveness of our ballistic missiles. This is, of course, a complex problem. The increase yield is only one factor in the equation. Dr. Kistiakovsky said that only a few members of the Panel felt that a factor of two gain in warhead yield was a life or death matter. However, if there were no further testing, one would be left with only the yields now available.

Dr. Killian said that in considering what we might gain from continued testing he thought it very important to evaluate what improvements would be possible for the Soviet Union also.

Mr. McKelroy said that under conditions of no testing there develops a progressively decreasing confidence in their weapons on the part of the military.

Mr. Dillon said he thought that since large yield and even negaton weapons could be developed by means of underground testing of low yield mock-ups, it would seem that an underground ban would be dangerous. Dr. Kistiakovsky said

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that this would only be true if the Latter Hole theory proves workable. Even mock-up tests would involve yields [REDACTED]. Such yields could readily be detected by the improved Geneva system. Moreover, although there seems to be general agreement that the Latter Hole is a sound theory, there is no experimental evidence to support the theory. It is also unknown whether the large holes required could be built.

\* \* \*

REPORT OF LONDON MEETING OF THE JOINT GROUP OF US-UK SCIENTISTS

Dr. Killian explained that the London meeting had been convened, by agreement between Secretary Herter and British Foreign Secretary Lloyd, to provide for joint US-UK review of the underground detection problem and to permit our people to present to UK scientists the considerations developed by the US technical panel under the chairmanship of Dr. Bacher. He said that the aim of the group had been to reach agreement on the technical factors bearing on the underground detection problem so that the responsible policy officials in both the US and UK would be able to proceed on the basis of the same technical information.

(Dr. Killian then read to the principals the report of the Joint Group which is attached as Appendix A to this memorandum.)

Dr. Killian said it was clear that the UK scientists were persuaded of the theoretical validity of the Latter Hole idea. However, they had real doubts as to the practical possibilities of constructing such a hole and considered urgent study of the engineering problems involved to be necessary. They were not prepared to accept the judgments of the Bacher group on the probability factors of actually finding evidence of an underground violation through on-site inspection nor to accept the Bacher group's assessment of the usefulness of intelligence. They clearly felt that it would be unwise to present the Bacher report to the Soviets since the judgments expressed therein could be challenged on technical grounds.

Dr. Killian said that the Latter Hole possibility for concealing underground explosions remains the most significant problem in the underground picture. Until we obtain more factual information we will remain in a state of uncertainty which cannot be resolved. It will be necessary to proceed with the recommended high energy experiments and probably with nuclear tests, unless the high energy tests indicate a very serious defect in the theory.

In discussing the several recommendations for further research in the report of the Joint Group the principals agreed that Dr. Kistiakowsky should consult with the Department of Defense and the AEC with regard to an engineering study of the Latter Hole theory, and that the CIA should proceed with the inspection study of earthquakes and underground explosions.

Attachment:  
Appendix A

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